LISTING OF THE CLAIMS

1. (original) A direct-electrochemical-oxidation fuel cell for generating electrical energy from a solid-state organic fuel comprising:

a cathode provided with an electrochemical-reduction catalyst that promotes formation of oxygen ions from an oxygen-containing source at the cathode;

an anode provided with an electrochemical-oxidation catalyst that promotes direct electrochemical oxidation of the solid-state organic fuel in the presence of the oxygen ions to produce electrical energy; and

a solid-oxide electrolyte disposed to transmit the oxygen ions from the cathode to the anode,

wherein direct electrochemical oxidation at the anode occurs according to the reaction:

$$C + 2O^{2-} \rightarrow CO_2 + 4e^{-}.$$

2. (original) The fuel cell according to claim 1, wherein formation of the oxygen ions at the cathode proceeds according to the reaction:

$$O_2 + 4e^{-} \rightarrow 2O^{2-}.$$

3. (original) The fuel cell according to claim 1, wherein the solid-state organic fuel is coal, graphite, biomass or a combination thereof.

4. (original) The fuel cell according to claim 3, wherein the biomass is selected from a group consisting of peat, rice hulls, and corn husks.

5. (original) The fuel cell according to claim 1, wherein the direct electrochemical oxidation at said anode produces a product comprising a CO_2 concentration of at least 50 mol %.

6. (original) The fuel cell according to claim 1, wherein the electrochemical-reduction catalyst is lanthanum strontium manganese oxide.

7. (currently amended) The fuel cell according to claim 1, wherein the electrochemical-reduction catalyst is selected from ~~the group consisting of LSF; LSCF; SSC;~~ $La_{0.8}Sr_{0.2}FeO_3$ (LSF); $La_{0.6}Sr_{0.4}Fe_{0.8}Co_{0.2}O_3$ (LSCF); $Sm_{0.5}Sr_{0.5}CoO_3$ (SSC); $YBa_2Cu_3O_y$, wherein y is an integer having values within a range of ~~7-9~~ 7 to 9; $La_{0.99}MnO_3$; $LaMnO_3$; $La_xSr_yMn_3$ and $La_xCa_yMnO_3$, wherein x is a number having values within a range of ~~0.6-0.95~~ 0.6 to 0.95, and y is a number having values within a range of ~~0.1-0.4~~ 0.1 to 0.4.

8. (currently amended) The fuel cell according to claim 1, wherein the electrochemical-reduction catalyst is selected from ~~the group consisting of~~ a material having a general formula of $A_xB_yCO_3$, wherein A is selected from ~~the group consisting of~~ La, Gd, Sm, Nd, Pr, Tb and Sr, B is selected from ~~the group consisting of~~ Sr, Ce, and Co, x is a number having values within a range of ~~0.6-0.94~~ 0.6 to 0.94, and y is a number having values within a range of ~~0.1-0.4~~ 0.1 to 0.4.

9. (original) The fuel cell according to claim 1, wherein the electrochemical-oxidation catalyst provided to the anode includes platinum.

10. (currently amended) The fuel cell according to claim 1, wherein the electrochemical-oxidation catalyst includes ~~Rhenium~~ rhenium.

11. (original) The fuel cell according to claim 10, wherein the electrochemical-electrochemical oxidation catalyst is Re–NiO/YSZ.

12. (original) The fuel cell according to claim 10, wherein the electrochemical-oxidation catalyst is Cu oxide-Pt.

13. (currently amended)The fuel cell according to claim 1, wherein the solid-oxide electrolyte is selected from ~~the group consisting of~~ doped oxides of Bi, Zr, Hf, Th, and Ce with either alkaline earth oxides such as CaO or MgO, or rare-earth oxides ~~such as~~ selected from Sc_2O_3, Y_2O_3, and Yb_2O_3~~, and the like. For example, embodiments of the present invention include a solid-oxide electrolyte 18 comprising at least one of Bi_2O_2, $(Bi_2O_7)_{0.75}(Y_2O_3)_{0.25}$, $BaTh_{0.9}Gd_{0.1}O_3$, $La_{0.8}Sr_{0.2}Ga_{0.8}Mg_{0.2}O_3$, $(Ce_2)_{0.8}(GdO_{0.5})_{0.2}$, $(ZrO_2)_{0.9}(Sc_2O_3)_{0.1}$, $(ZrO_2)_{0.9}(Y_2O_3)_{0.1}$, $(ZrO_2)_{0.87}(CaO)_{0.13}$, $(La_2O_3)_{0.95}(SrO)_{0.05}$~~.

14. (original) The fuel cell according to claim 1, wherein the solid-oxide electrolyte is selected from the group consisting of yttrium-stabilized zirconium and bismuth oxide.

15. (original) The fuel cell according to claim 1, further comprising a housing that encloses the anode for receiving the solid-state organic fuel.

16. (original) The fuel cell according to claim 15, further comprising feed passage through which the solid-state organic fuel can be inserted into the housing.

17. (original) The fuel cell according to claim 1, wherein the electrochemical oxidation that occurs at the anode produces a product comprising a NO_x concentration of less than 5 mol %, wherein x is an integer within a range of 1 to 3.

18. (original) The fuel cell according to claim 17, wherein the fuel cell has a maximum operating temperature of about 1200°C.

19. (original) The fuel cell according to claim 1, wherein the direct electrochemical oxidation that occurs at the cathode results in a product comprising a CO concentration that is less than 10 mol %.

20. (original) The fuel cell according to claim 19, wherein the fuel cell has a maximum operating temperature of about 1200°C.

21. (original) The fuel cell according to claim 1, wherein the fuel cell produces an electrical current of at least 100 mA/cm^2 for a period of time lasting at least 48 hours.

22. (original) The fuel cell according to claim 1, wherein the fuel-conversion efficiency of the fuel cell is at least 30 mol % at 950°C.

23. (original) A direct-electrochemical-electrochemical oxidation fuel cell for generating electrical energy from a solid-state organic fuel comprising:

a cathode provided with an electrochemical-reduction catalyst that promotes the formation of ions from an ion source at the cathode;

a anode provided with an electrochemical-oxidation catalyst that includes a sulfur-resistant material and promotes electrochemical oxidation of the solid-state organic fuel in the presence of the ions formed at the cathode to produce electrical energy; and

a solid-oxide electrolyte disposed to transmit the ions from the cathode to the anode.

24. (original) The fuel cell according to claim 23, wherein the sulfur-resistant material includes at least one of Re, Mn and Mo.

25. (currently amended) The fuel cell according to claim 24, wherein the sulfur-resistant material is selected from ~~the group consisting of~~ Re–NiO/YSZ and Cu oxide-Pt.

26. (original) The fuel cell according to claim 23, wherein the electrochemical-reduction catalyst is lanthanum strontium manganese oxide.

27. (currently amended)The fuel cell according to claim 23, wherein the electrochemical-reduction catalyst is selected from ~~the group consisting of LSF; LSCF; SSC;~~ $La_{0.8}Sr_{0.2}FeO_3$ (LSF); $La_{0.6}Sr_{0.4}Fe_{0.8}Co_{0.2}O_3$ (LSCF); $Sm_{0.5}Sr_{0.5}CoO_3$ (SSC); $YBa_2Cu_3O_y$, wherein y is an integer having values within a range of ~~7-9~~ 7 to 9; $La_{0.99}MnO_3$; $LaMnO_3$; $La_xSr_yMn_3$ and $La_xCa_yMnO_3$, wherein x is a number having values within a range of ~~0.6-0.95~~ 0.6 to 0.95, and y is a number having values within a range of ~~0.1-0.4~~ 0.1 to 0.4.

28. (original) The fuel cell according to claim 23, wherein the ions formed at the cathode are oxygen ions formed according to the reaction:

$$O_2 + 4e^- \rightarrow 2O^{2-}.$$

29. (original) The fuel cell according to claim 23, wherein the solid-state organic fuel is coal, graphite, biomass, polymers or a combination thereof.

30. (currently amended) The fuel cell according to claim 29, wherein the biomass is selected from ~~a group consisting of~~ peat, rice hulls, and corn husks.

31. (currently amended) The fuel cell according to claim 23, wherein the solid-oxide electrolyte is selected from ~~the group consisting of~~ doped oxides of Bi, Zr, Hf, Th, and Ce with either alkaline earth oxides such as CaO or MgO, or rare-earth oxides ~~such as~~ selected from Sc_2O_3, Y_2O_3, and Yb_2O_3~~, and the like. For example, embodiments of the present invention include a solid-oxide electrolyte 18 comprising at least one of Bi_2O_2, $(Bi_2O_7)_{0.75}(Y_2O_3)_{0.25}$, $BaTh_{0.9}Gd_{0.1}O_3$, $La_{0.8}Sr_{0.2}Ga_{0.8}Mg_{0.2}O_3$, $(Ce_2)_{0.8}(GdO_{0.5})_{0.2}$, $(ZrO_2)_{0.9}(Sc_2O_3)_{0.1}$, $(ZrO_2)_{0.9}(Y_2O_3)_{0.1}$, $(ZrO_2)_{0.87}(CaO)_{0.13}$, $(La_2O_3)_{0.95}(SrO)_{0.05}$~~.

32. (original) The fuel cell according to claim 31, wherein the solid-oxide electrolyte is selected from the group consisting of yttrium-stabilized zirconium and bismuth oxide.

33. (original) The fuel cell according to claim 23, wherein electrochemical oxidation of the solid-state organic fuel at the anode produces a product having a CO_2 concentration of at least 50 mol %.

34. (original) The fuel cell according to claim 33, wherein the fuel cell has a maximum operating temperature that is less than 1200°C.

35. (original) The fuel cell according to claim 23, wherein electrochemical oxidation of the solid-state organic fuel at the anode produces a product having a NO_x concentration that is less than 0.1 mol %, wherein x represents integers ranging from 1 to 3.

36. (currently amended) The fuel cell according to claim 23, wherein the electrochemical-oxidation catalyst is selected from ~~the group consisting of~~ a noble metal, group VIII metal/metal oxide~~, such as Pt, Cu, Ag, Au, Pd, Ni,~~ oxides of ~~the aforementioned~~ sulfur-resistant materials, oxides of Ce, Cr, Fe, and Pb, combinations thereof, multiple oxides~~, combinations including one or more of the aforementioned metals~~, Cu oxide-Pt, and Re–NiO/YSZ, wherein the electrochemical-oxidation catalysts including non-noble metals also include a sulfur-resistant substance selected from ~~the group consisting of~~ Re, Mn, Mo, Ag, Cu, and Au.

Claims 37 through 40, cancelled.

41. (new) The fuel cell according to claim 13, wherein the solid oxide electrolyte comprises at least one of Bi_2O_2, $(Bi_2O_7)_{0.75}(Y_2O_3)_{0.25}$, $BaTh_{0.9}Gd_{0.1}O_3$, $La_{0.8}Sr_{0.2}Ga_{0.8}Mg_{0.2}O_3$, $(Ce_2)_{0.8}(GdO_{0.5})_{0.2}$, $(ZrO_2)_{0.9}(Sc_2O_3)_{0.1}$, $(ZrO_2)_{0.9}(Y_2O_3)_{0.1}$, $(ZrO_2)_{0.87}(CaO)_{0.13}$, $(La_2O_3)_{0.95}(SrO)_{0.05}$.

42. (new) The fuel cell according to claim 31, wherein the solid oxide electrolyte comprises at least one of Bi_2O_2, $(Bi_2O_7)_{0.75}(Y_2O_3)_{0.25}$, $BaTh_{0.9}Gd_{0.1}O_3$, $La_{0.8}Sr_{0.2}Ga_{0.8}Mg_{0.2}O_3$, $(Ce_2)_{0.8}(GdO_{0.5})_{0.2}$, $(ZrO_2)_{0.9}(Sc_2O_3)_{0.1}$, $(ZrO_2)_{0.9}(Y_2O_3)_{0.1}$, $(ZrO_2)_{0.87}(CaO)_{0.13}$, $(La_2O_3)_{0.95}(SrO)_{0.05}$.